

REMARKS

The specification has been amended to replace the formula such as “ $(D-C)/C \times 100(\%)$ ” with the formula -- $[(D-C)/C] \times 100(\%)$ --. Claims 1-4 have been cancelled without prejudice or disclaimer.

Claim 5 has been amended to recite a process for preparing a perfluoroelastomer seal material comprising a step of treating a perfluoroelastomer molded article with a solvent having at least 50 % of a swelling rate based on said molded article, when said molded article is immersed at 60°C for 70 hours,

wherein said molded article is obtained by crosslinking a perfluoroelastomer through at least one crosslinking system selected from the group consisting of an imidazole crosslinking system, a triazine crosslinking system, an oxazole crosslinking system and a thiazole crosslinking system.

wherein a volume of the untreated molded article is C as measured by the underwater substitution method, a volume of the molded article in a state of swelling is D and the swelling rate of the molded article is calculated by $[(D-C)/C] \times 100(\%)$. Support is found, for example, at page 13, line 24 to page 14, line 3 and page 31, lines 12-19 of the specification.

New claims 6-9 have been added. Claims 6-9 correspond to claims 1-4, respectively, but depend from claim 5 primarily or secondarily.

No new matter has been added, and entry of the Amendment is respectfully requested.

Upon entry of the Amendment, claims 5-9 will be pending.

The disclosure was objected to because the Examiner considered the calculation formula such as “ $(D-C)/C \times 100(\%)$ ” (page 31, line 19 and throughout specification) to be improper and unclear.

As noted, the specification has been amended to clarify the calculation formula.

Withdrawal of the objection to the disclosure is requested.

Claim 5 was objected to because, per the Examiner, it is unclear whether the solvent's swelling rate of "at least 50 %" recited therein is applied to the starting "molded article" or the final "solvent-treated seal material."

As noted, claim 5 has been amended to define the swelling rate. Withdrawal of the objection to claim 5 is requested.

Claim 5 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Saito et al (EP 1,209,175) or Kawasaki et al (US 7,309,743) in view of a combination of four references including Anolick et al (US 5,478,905, "Anolick '905"), Anolick et al (US 5,637,663, "Anolick '663"), Amin et al (US 5,444,116, "Amin '116") and Amin et al (US 5,461,107, "Amin '107").

Initially, the Examiner is respectfully requested to list Anolick '905", Anolick '663, Amin '116 and Amin '107 on a Notice of References Cited, Form PTO-892.

This rejection should be withdrawn because the cited references do not disclose or render obvious the present invention, either alone or in combination.

In the present invention, the inventors recognized problems as to the existence of a component having a low molecular weight and uncrosslinked polymers. Then, the present inventors adopted the step of treating a perfluoroelastomer molded article, obtained by crosslinking a perfluoroelastomer through specific crosslinking systems, with a specific solvent to remove the component having a low molecular weight and uncrosslinked polymers. Thereby, a perfluoroelastomer seal material improved in adhesion strength to the material of the other end, and in stain, corrosion and color change of the contact surface was obtained. See, page 3, lines 11-15 and Table 1 at page 37 of the specification.

Saito et al discloses a fluorine-containing elastomeric terpolymer which consists of ethylene unit, hexafluoropropylene unit and vinylidene fluoride unit (abstract). However, there is no disclosure of perfluoroelastomer in Saito et al. Further, Saito et al does not recognize the problem caused by the existence of the component having a low molecular weight and uncrosslinked polymers.

Kawasaki et al merely discloses general properties of a fluorine-containing elastomer, especially perfluoroelastomer. Kawasaki et al discloses that perfluoroelastomer is widely used as a sealing material to be used under hard environment because of excellent chemical resistance, solvent resistance and heat resistance thereof (col. 1, lines 25-29). That is, Kawasaki et al recognizes that the fluorine-containing elastomer already have excellent chemical resistance, solvent resistance and heat resistance and there is no motivation to further improve these properties. Therefore, there is no teaching or suggestion in Kawasaki et al to adopt the step of the present invention to solve the problem caused by the existence of the component having a low molecular weight and uncrosslinked polymers.

Anolick '905 and Anolick '663 merely disclose properties of amorphous tetrafluoroethylene-hexafluoropropylene (TFE-HFP) dipolymer which can be readily dissolved in perfluorinated solvent (abstract; Anolick '905 at col. 5, lines 27-34; Anolick '663 at col. 9, lines 30-41). There is no teaching or suggestion in Anolick '905 and Anolick '663 to use this property to remove the component having a low molecular weight and uncrosslinked polymers from a crosslinked molded article.

Amin '116 and Amin '107 disclose an elastomeric composition including a perfluoroelastomer and a non-fibrillating particulate fluorographite and a method of making the same (abstract). In their Examples, Table IV presents results of immersion testing of O-rings of

Samples 1 to 6, which are obtained by using peroxide curing system, 2,5-dimethyl-2,5-di(t-butylperoxy)-hexane as a curing agent, in perfluorotributylamine. However, this immersion testing is conducted to measure the percent change in tensile strength and percentage elongation after immersing the molded article. That is, perfluorotributylamine in Amin '116 and Amin '107 is used as one of the strong erosive compounds and it is not used for the purpose of immersing the component having a low molecular weight and uncrosslinked polymers.

Further, there is no teaching or suggestion in Amin '116 and Amin '107 to adopt the step of treating a perfluoroelastomer molded article obtained by crosslinking a perfluoroelastomer through the claimed specific crosslinking systems with a specific solvent.

Still further, the subjects of Amin '116 and Amin '107 are the molded articles before treatment with perfluorotributylamine and are not molded articles after treatment with perfluorotributylamine as in the present invention.

In view of the above, present claim 5 is not obvious over Saito et al, Kawasaki et al, Amin '116, Amin '107, Anolick '905 and Anolick '663, either alone or in combination.

Saito et al does not teach a perfluoroelastomer. Accordingly, the molded article of the present invention cannot be obtained by combining Saito et al with the secondary references.

Present claim 5 relates to a process of preparing a perfluoroelastomer seal material comprising a step of treating a perfluoroelastomer molded article obtained by crosslinking a perfluoroelastomer through specific crosslinking systems with a specific solvent.

However, Saito et al discloses in paragraph [0070] that "polyol vulcanization method is most preferable for the composition for vulcanization of the present invention while it is a matter of course that peroxide vulcanization and polyamine vulcanization can be adopted." Saito et al does not teach or suggest using an imidazole crosslinking system, a triazine crosslinking system,

an oxazole crosslinking system and a thiazole crosslinking system, as required by the present claims. Therefore, the structure of the obtained molded article in Saito et al is different from that of the present invention.

Amin '116 and Amin '107 disclose that "[a]n example of a suitable curing agent is a combination of an organic peroxide, such as 2,5-dimethyl-2,5-di(t-butylperoxy)-hexane, and a coupling agent, such as triallyl isocyanurate" (col. 6, lines 32-36 of Amin '116 and col. 6, lines 15-18 of Amin '107). Amin '116 and Amin '107 do not teach or suggest using the claimed specific crosslinking systems. Because the crosslinking system of Amin '116 and Amin '107 is different from that of the present invention, the structure of the obtained molded article is different from that of the present invention.

Kawasaki et al merely discloses general properties of a perfluoroelastomer and there is no disclosure of the problems solved by of the present invention. That is, Kawasaki et al does not teach or suggest that there would be any elution of "uncoupled and non-crosslinked" fluoropolymer from the elastomers. According to Kawasaki et al, the fluorine-containing elastomers already have excellent chemical resistance, solvent resistance and heat resistance. Accordingly, one skilled in the art would not have been motivated to modify the teaching of Kawasaki et al.

Anolick '905 and Anolick '663 merely disclose the property of amorphous TFE-HFP dipolymer and there is no disclosure of the problems solved by the present invention. Further, one skilled in the art would not have been motivated to immerse a molded article for sealing in perfluorotributylamine in view of the teachings of Anolick '905 and Anolick '663, because the molded article might dissolve in perfluorotributylamine. In fact, Anolick '905 and Anolick '663 teach away from immersing a molded article for sealing in perfluorotributylamine.

Additionally, none of the references teach or suggest the superior results provided by the present invention.

Accordingly, the present invention is not obvious and is patentable over the cited references, either alone or in combination. Reconsideration and withdrawal of the §103(a) rejection based on Saito et al, Kawasaki et al, Amin '116, Amin '107, Anolick '905 and Anolick '663 are respectfully requested.

New claims 6-9 are patentable over the cited references for at least the same reasons that claim 5 is patentable, as discussed above.

Allowance of claims 5-9 is respectfully requested. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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CUSTOMER NUMBER

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